

PROBLEM STATEMENT

TRUCKEE RIVER

Total Maximum Daily Load (TMDL) For Sediment

Truckee River Hydrologic Unit, Sierra, Nevada, and Placer Counties

Updated November 18, 2002

OVERVIEW

Section 305 (b) of the Clean Water Act (CWA) mandates biennial assessment of the nation's water resources. These water quality assessments are used to identify and list those waters that are not achieving water quality standards. The resulting list is referred to as the 303 (d) list. The CWA also requires states to establish a priority ranking for these impaired waters, and to develop and implement TMDLs. A TMDL specifies the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards. A TMDL allocates pollutant loadings to point and non-point sources such that those standards will be met.

The Truckee River was first included on the 1992 section 303 (d) list for impairment due to excessive sedimentation. The listing is based upon best professional judgment. This Judgment considered the high quality of the Truckee's waters, the importance of the beneficial uses, the watershed's sensitivity to disturbance, the historic legacy of sediment from past land disturbance, and the ongoing increase of sediment producing land uses. Unpublished reports, complaints and violations were also considered. See "303 (d) listing basis" below for details.

APPROACH

Hypothesis

Truckee River was listed with little quantifiable evidence, and with limited information directly linking excessive sedimentation to the impairment of beneficial uses. Therefore, the Problem Statement will be viewed as a hypothesis. The hypothesis statement is: The Truckee River is impaired by excessive sedimentation, and beneficial uses are impaired. This hypothesis will be investigated through the development of the TMDL. A secondary hypothesis that will be investigated is: The natural range of sediment load variability supports and protects most beneficial uses. If the natural range including frequency, magnitude, duration, amount, and timing of sediment load can be described, then loads that fall within that range can be permitted. Controllable loads outside that range can be reduced by sediment source-reduction.

Truckee River Sediment TMDL Collaborative Project

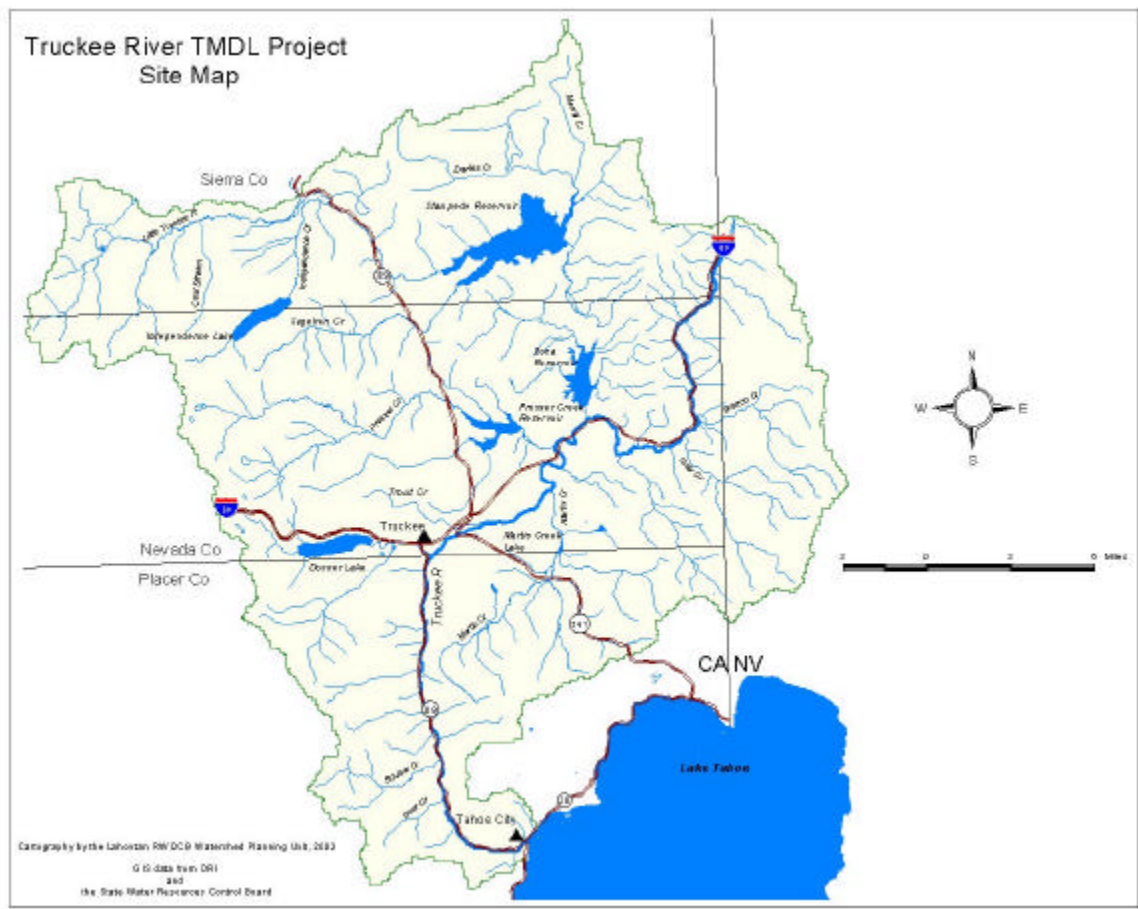
The Truckee River and its tributaries are highly valued by the local and visiting communities. Much of the region's economic productivity depends upon high quality, naturally functioning, and aesthetic water resources. The community has demonstrated great interest in exploring the hypothesis. They have also demonstrated an interest in a high level of involvement in regulatory processes affecting them. These factors suggest

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that an extensive community-based collaborative project may produce the best Sediment TMDL. Ideally, the project will result in a TMDL that is both protective of water quality, and willingly implementable. One important expected outcome is a productive educational exchange between the Regional Board and the community.

PROJECT AREA DESCRIPTION

Location Map



Geography

The Truckee River watershed encompasses the entire Lake Tahoe, Truckee River, and Pyramid Lake systems. However, for the purposes of this TMDL, the planning area includes the portion of the watershed extending from the outflow of Lake Tahoe to the California/Nevada State line, or Hydrologic Unit 635.00. This includes 15 miles of channel from Tahoe City in Placer County, through the Town of Truckee in Nevada County, to the State line between Sierra and Washoe Counties. This area encompasses 273,920 acres of mountainous topography. Creek. Other waterbodies within the watershed that are also 303 (d) listed for sediment include: Bear Creek, Squaw Creek, Bronco Creek and Gray Creek. Watershed impoundments include Lake Tahoe, Donner Lake, Independence Lake, Webber Lake, Boca Reservoir, Stampede Reservoir, Prosser Creek Reservoir, and Martis Creek Reservoir. For continuity of process, the study area will include portions of the Bronco and Grey Creek watersheds, which originate in Nevada, but terminate in California.

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Waterbody Description

The Truckee River, in the project area, flows northward from the outlet of Tahoe to the Town of Truckee where it turns eastward to the state line. Stream flow is perennial, but varies seasonally. High flows of the longest duration result from spring snowmelt. The highest flows of short duration are associated with large rain on snow events in late winter. Flow is dominated in the dry summer periods by reservoir releases. Bedrock, boulder and cobble form the channel bed through this steep, relatively confined section of the river.

Land Use

Land uses that potentially cause sediment within the watershed are timber harvest, grazing, increasing urbanization; roads and trails associated with transportation and recreation as well as ski resort development and dispersed forest recreation. The US Forest Service manages Sixty percent of the watershed. One owner manages the majority of private timberlands. Some private and public meadow systems are used for sheep and cattle grazing. Dispersed recreation includes off highway vehicle use, mountain biking and hiking. Development is increasing in Bear Creek, Squaw Creek, Martis Creek watersheds and in the watersheds surrounding the Town of Truckee.

303 (d) LISTING BASIS**Surface Water Quality Objectives Violated and Standards Not Attained**

The Water Quality Control Plan for the Lahontan Basin (Basin Plan) reads: The suspended sediment load and suspended sediment discharge rate of surface waters shall not be altered in such a manner as to cause nuisance or adversely affect the water for beneficial uses. Water Quality Objectives for sediment, settleable and suspended materials. Narrative water quality objectives for the entire Lahontan Region including the Truckee River include the following: non-degradation objective, non-degradation of aquatic communities and populations, sediment, and settleable materials, suspended materials, and turbidity. See www.swrcb.ca.gov/rwqcb6 for Basin Plan. The only numeric standard related to sediment specific to the Truckee River is turbidity. Turbidity shall not be raised above 3 NTU mean of monthly means. The following specifies violations to these objectives and standards.

- **3 NTU:** According to Nevada Division of Environmental Protection data as analyzed by regional board staff, the Mean of Monthly Means at Farad is 3.19 for the period of 1990 to 2000. According to provisional data collected and analyzed by the California Department of Water Resources, the Mean of Monthly Means at Farad is 4.02 for the period of May 2002 to October of 2002.
- **Sediment, settleable and suspended materials:** These pollutants have been identified in the SWRCB's "Water Quality Survey of the Truckee River" 1973, and also in USGS, "Data on Surface Water Quality, Truckee River System", 1981. 31 sediment related violations leading to enforcement actions were found in a search of the Regional Board's SWIM database from 1995 to the present. The rate of violations has increased in recent years. 34 sediment related complaints were found between 3/01 and 10/02.

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- **Non-degradation of aquatic communities and impact to beneficial uses:**
Municipal and Domestic Supply: Sierra Pacific Power Company “Water Production Reliability Study” 1994 states that the Glendale plant is limited to treating water of 25 ntu or less. It also states that the Chalk Bluff plant is designed to treating turbidity values up to 350 ntu. Treatment plants are closed due to excessive turbidity once in the spring on average, and twice in the summer. (Personal communication with Bill Hauck, TMWA)
Aquatic communities: Benthic macroinvertebrates have been adversely impacted by excessive sedimentation. Cordone and Pennoyer, California Department of Fish and Game, “Notes on Silt Production in the Truckee River Drainage”, Inland Fisheries Administrative Report No. 60-14, 1960. Koch and Hainline, The Desert Research Institute, “Benthic Macro-Invertebrate Populations in the Truckee River”, Project Report No. 41, 1976.
Water Contact Recreation and Non Contact Recreation: Kayser, “Truckee River Canyon, Recreational Uses and Impacts”, 1980 describes sediment related impacts to the Truckee’s recreational uses.

Because of the difficulty determining a quantitative violation of narrative standards, and because of the difficulty linking the 3ntu mean of monthly means standard to impacts on all beneficial uses, this TMDL will seek to identify Numeric Targets that quantifiably assess the protection of beneficial uses.

Beneficial Uses

According to the 1995 Water Quality Control Plan for the Lahontan Region (Basin Plan), The Truckee River supports the following beneficial uses:

- Municipal and Domestic Supply (MUN)
- Agricultural Supply (AGR)
- Groundwater Recharge (GWR)
- Water Contact Recreation (REC-1)
- Non-Contact Water Recreation (REC-2)
- (Commercial and Sport Fishing (COMM)
- Freshwater Replenishment (FRSH)
- Hydropower Generation (POW)
- Cold Freshwater Habitat (COLD)
- Wildlife Habitat (WILD)
- Rare, Threatened or Endangered Species (RARE)
- Migration of Aquatic Organisms: (MIGR)
- Spawning, Reproduction, and Development (SPWN)
- Water Quality Enhancement (WQE)
- Flood Peak Attenuation/Flood Water Storage (FLD).

Complete definitions for these uses can be found in the Basin Plan. Increased sedimentation has been linked to the impairment of all of these beneficial uses. These general linkages are well described in the scientific literature.

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Possible Impairment of Beneficial Uses by Increased Sediment

The following list describes suspected impairments to the beneficial uses. These impairments will be validated or refuted through the investigation provided by the TMDL process. Many of these impacts can be reduced or eliminated by carefully and consistently applied best management practices. The Truckee River TMDL Collaborative Project is intended to provide for education leading to widespread voluntary implementation and the development of new, regionally specific best management practices.

MUN: Downstream municipal and domestic users who draw their water from the Truckee River have been adversely affected by sediment. Excessive sediment loading during storm events has caused shutdown of the intake on Truckee Meadows Water Authority's (TMWA) Chalk Bluff treatment plant and led to water rationing. Chalk Bluff can treat water with turbidity values into 1,000 ntu, but at great expense. (Personal communication with Bill Hauck, TMWA)

AGR: The agricultural use of water in the TMDL study area is limited by climate to livestock grazing. Geomorphic responses to increased sediment load can include channel down cutting, which in turn lowers the water table in meadow areas, damaging range vegetation.

GWR: Land use changes within the Truckee River watershed have increased impervious surfaces, caused soil compaction, and reduced vegetative cover, resulting in lower infiltration rates, reducing quality and quantity of groundwater recharge. Communities in the TMDL study area (California) rely predominantly on groundwater for municipal supply. The Martis Valley aquifer supplies water to the most populated portions of the watershed. Dependence on this aquifer is increasing with increased demand.

REC-1: the Truckee River supports all rec-1 (water contact) activities. The aesthetic quality of recreation is impaired as clarity declines.

REC-2: Numerous complaints regarding the aesthetic concerns of turbid water have been received and investigated by Regional Board staff.

COMM: Recreational fishing and commercial guiding are impaired when COLD, MIGR, SPWN are impaired.

WILD: See RARE. Healthy native vegetation to support wildlife requires a natural range of variability in physical and biological process and function. Excessive sediment and disturbed upland areas can exceed thresholds required by wildlife.

COLD: Cold freshwater habitat is impaired by an increase in the sediment budget in a large variety of ways involving physical and biological process linkage and response the investigation of these relationships will form the basis of the Truckee River TMDL.

RARE: The willow flycatcher depends upon healthy willow vegetation that is damaged by geomorphic responses induced by excessive sediment loading. Lahontan Cutthroat Trout depend upon physical and biological system components adapted to a sediment regime in balance with its hydrologic regime. Changes in sediment discharge, frequency, magnitude, and timing outside the expected range of variability can induce threshold geomorphic events, resulting in unsuitable habitat.

MIGR: Changes to channel form and velocity distribution (pools, runs and riffles) resulting from increased sediment limit migration and movement of aquatic organisms.

SPAWN: Reproduction and rearing are limited by high bedload, poor pool quality, and inadequate substrate size. This is a result of increased sediment availability.

WQE: Increased sediment loading can compromise the natural ability of the meadows and wetlands to settle, treat and store sediment through channel aggradation and increased rate of braiding, anastomose or meander cut-off.

FLD: An increase in sediment loading can result in channel aggradation, reducing capacity for flood peak attenuation. Infiltration rates can be altered as well as discussed above in GWR

In addition to alterations in sediment discharge, hydrologic alterations affecting flow and ultimately the system's ability to transport sediment must be considered too. Changes to the hydrologic cycle include: Snowmaking, reservoir operation, ground water pumping, infiltration rates reduced by impervious surface and vegetation removal, soil compaction and re-routing of natural drainage patterns by dirt and paved roads.

Status

Assembly of background materials is complete. Literature review is well under way. A contract for sediment related water quality assessment and modeling, by the Desert Research Institute (DRI), has been completed. Extensive digital mapping and data base assembly were conducted as part of this report. Science contracts with DRI and The California Department of Water Resources (DWR) are under way to provide continuous turbidity sampling at four locations, to describe the existing sediment hydrograph and to develop the relationship between turbidity and sediment load. This will allow turbidity to be used as a surrogate for sediment load. Other related scientific investigations have been completed in tributary watersheds, notably geomorphic assessment and benthic macroinvertebrates studies. Staff has completed training in collaboration. The California Center for Public Dispute Resolution (CCPDR) has been hired to facilitate the Truckee River TMDL Collaborative Project, and the Truckee River Watershed Council serves as neutral convenor to the Project. Three Stakeholder meetings have been held.

Schedule

Milestone	Date
Initiate TMDL Project	June 1999
Submit Problem Statement to Federal EPA	June 2000
Complete initial sediment source analysis	June 2001
Begin Planning for Collaborative Project	November 2001
Public Forum to initiate Collaborative Project	September 2002
Recommendation Report on Collaborative (Go/No Go)	March 2003
Guidance Report from Stakeholders	December 2003
Technical TMDL (Problem Statement to Load Allocations)	June 2004
TMDL Implementation and Monitoring Plan	June 2005
Final TMDL to Regional Board	August 2005
Submit TMDL to Federal EPA for approval	June 2006

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